Geophysical Research Abstracts
Vol. 20, EGU2018-14146-1, 2018
EGU General Assembly 2018

Evaluating key controls on sediment flux to the Gulf of Corinth over the last 130 kyrs using a forward modeling approach

Sofia Pechlivanidou (1), Guillaume Duclaux (2), Tristan Salles (3), Casey Nixon (1), Patience Cowie (1), Robert Gawthorpe (1), and Ritske Huismans (1)

(1) University of Bergen, Earth Science, Bergen , Norway (sofia.pechlivanidou@geo.uib.no), (2) Université Côte d'Azur, CNRS, OCA, IRD, Géoazur, Valbonne, France, (3) School of Geosciences, University of Sydney, Australia

We investigate landscape development and basin stratigraphy for the Corinth rift, central Greece, over the past 130 kyrs using surface processes modeling*. The Corinth rift, active since the late Pliocene, is one of the most rapidly extending continental rifts on Earth. Progressive growth and linkage of predominantly north-dipping faults has resulted in the formation of an east-west oriented asymmetric graben since Late Pleistocene characterized by alternating marine and lacustrine deposition. Our model set-up is based on exceptional field data in the area. We use published fault slip rates and constraints on faults geometries from offshore seismic data to construct vertical displacement maps that we imposed to the surface process model. A global sea-level curve is used to account for eustatic vs. lacustrine fluctuations in base-level. We classify bedrock erodibility according to elevation and slope for mapped onshore lithostratigraphic units. Orographic precipitation is included. To validate our modeling results we compare the total modeled sediment volume and deposition pattern with mapped offshore sediments interpreted from reflection seismic. We also compare modeled and observed landscape morphologies. We quantify the relative importance of: i) pre-rift topography, ii) drainage area, iii) lithology, iv) tectonic uplift rate, and v) precipitation, on sediment flux from selected catchments along the southern and northern rift margins. We find that $\sim$45 % of the total sediment flux is derived from the tectonically quiescent northern margin, a consequence of significant pre-rift topography in this area. Active faulting along the southern rift margin controls the pattern of deposition offshore but has only a modest effect on onshore sediment flux because areas of active footwall uplift are of limited spatial extent. The impact of longer-term tectonic activity is evidenced by increased relief, and hence flux, but also drainage reversals, >620 ka, as catchments became back-tilted away from the rift by footwall rotation. This study allows us to assess a wide range of contributing factors influencing erosion and deposition in active rifts.

*https://github.com/badlands-model/pyBadlands